

CLAIMS:

5 1. A cable modem termination system (CMTS) that can receive signal bursts transmitted on an upstream channel of a cable modem system, the CMTS comprising:

a demodulator for receiving the signal bursts on the upstream channel;

10 a media access controller (MAC) that generates for downstream transmission MAP messages that assign time slots in which cable modems may transmit signal bursts on the upstream channel, the MAP messages including idle slots that are assigned to no cable modems;

15 a transmitter that transmits the MAP messages with the idle slots downstream to the cable modems; and

a device connected to the demodulator for sensing cable conditions on the upstream channel during the idle slots.

20 2. The CMTS of claim 1, in which the device is a notch filter having coefficients that compensate for noise on the upstream channel.

25 3. The CMTS of claim 2, additionally comprising a decision feedback equalizer connected to the demodulator and the notch filter, the decision feedback equalizer having a feedback filter with the same coefficients as the notch filter to compensate for its distortion.

30 4. The CMTS of claim 3, in which the decision feedback equalizer has a feedforward filter for establishing pre-equalization coefficients.

35 5. The CMTS of claim 4, in which the demodulator converts the signal bursts to binary data, the system additionally

comprising a signal path for carrying the binary data from the demodulator to the MAC, the notch filter and the decision feedback
5 equalizer being in the signal path.

6. The CMTS of claim 5, in which the signal path carries both the binary data and pre-equalization coefficients to the MAC in band such that the coefficients are appended to the binary data.

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7. The CMTS of claim 6, in which the pre-equalization coefficients do not reflect noise received by the demodulator, the system additionally comprising an upstream transmitter for transmitting the pre-equalization coefficients established by the feedforward filter.

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8. The CMTS of claim 7, in which the upstream transmitter is connected to the MAC to transmit the pre-equalization coefficients established by the feed forward filter.

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9. A cable modem termination system (CMTS) that can receive a signal transmitted in a cable modem system on an upstream channel, the CMTS comprising:

a demodulator;

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a notch filter connected to the demodulator, the notch filter having coefficients that are adjustable to cancel noise applied to the demodulator;

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a media access controller (MAC) that processes binary data and generates for downstream transmission MAP messages that assign time slots in which cable modems may transmit signal bursts on the upstream channel; and

a decision feedback equalizer coupled to the demodulator, the decision feedback equalizer including a feedforward filter for establishing pre-equalization coefficients.

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5 10. The CMTS of claim 9, in which both binary data and pre-equalization coefficients are provided to the MAC in band such that
the coefficients are appended to the binary data.

10 11. The CMTS of claim 10, in which the pre-equalization coefficients do not reflect noise applied to the demodulator, the system additionally comprising an upstream transmitter connected to the MAC to transmit the pre-equalization coefficients established by the feedforward filter.

15 12. A method for compensating for conditions on an upstream channel from a plurality of cable modems to a cable modem termination system (CMTS), the method comprising the steps of:

20 transmitting on a downstream channel from the CMTS to a plurality of cable modems MAP messages that assign time slots in which cable modems may transmit signal bursts on the upstream channel, the MAP messages including idle slots that are assigned to no cable modems;

25 monitoring conditions on the upstream channel during the idle slots; and

compensating for the monitored conditions on the upstream channel; and

receiving at the CMTS signal bursts on the upstream channel after such compensation.

30 13. The method of claim 12, in which the monitoring step comprises sensing the noise on the upstream channel during the idle slots.

35 14. The method of claim 13, in which the compensating step comprises adjusting the coefficients of a notch filter to compensate for the sensed noise on the upstream channel during the idle slots.

15. The method of claim 14, in which the compensating step
further comprises adjusting a feedback filter of a decision
5 feedback filter in series with the notch filter to have the same
coefficients as the notch filter to compensate for its distortion.

16. The method of claim 15, additionally comprising the steps
of:

10 receiving on the upstream channel a ranging signal from
a cable modem;

adjusting coefficients of a feedforward filter of the
decision feedback filter responsive to the received ranging signal
to compensate for intersymbol interference on the upstream channel;
15 and

transmitting the adjusted coefficients on a downstream
channel to the cable modem for the purpose of pre-equalization.

17. The method of claim 16, in which the transmitting
20 steps transmit the MAP messages and the adjusted coefficients on
the same channel.

18. A method for compensating for conditions on an upstream
channel from a plurality of cable modems to a cable modem
25 termination system (CMTS), the method comprising the steps of:

compensating for noise on an upstream channel;

receiving on the compensated upstream channel a ranging
signal from one of the cable modems;

30 adjusting filter coefficients to compensate for
intersymbol interference on the upstream channel responsive to the
received ranging signal; and

transmitting the adjusted coefficients on a downstream
channel to the cable modem for the purpose of pre-equalization of
the upstream channel.

5 19.. The method of claim 18, in which the adjusting step
comprises adjusting coefficients of a feedforward filter of a
decision feedback filter.

10 20. The method of claim 19, in which the compensating step
comprises adjusting the coefficients of a notch filter in series
with the decision feedback filter.

15 21. The method of claim 20, in which the compensating step
further comprises adjusting a feedback filter of the decision
feedback filter to have the same coefficients as the notch filter to
compensate for its distortion.

20 22. The method of claim 21, additionally comprising the step
of transmitting on a downstream channel from the CMTS to the cable
modems MAP messages that assign time slots in which cable modems
may transmit signal bursts on the upstream channel.

25 23. The method of claim 22, in which the transmitting steps
transmit the MAP messages and the adjusted coefficients on the same
channel.

25 24. A cable modem comprising:
a transmitter for sending ranging signals to a cable
modem termination system (CMTS) to enable the CMTS to generate
equalization coefficients and return such equalization
coefficients;

30 a receiver for processing equalization coefficients
returned by the CMTS, the returned equalization coefficients not
reflecting noise received by the CMTS;

a source of data to be sent to the CMTS;

35 an equalizer connecting the source to the transmitter to
send the data to the CMTS, the returned coefficients being

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impressed on the equalizer to pre-equalize the data sent to the CMTS without reflecting noise received by the CMTS.

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